8

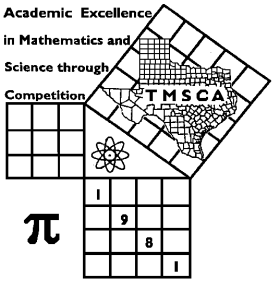
1st Score: _____	2nd Score: _____	3rd Score: _____	
S & G _____	S & G _____	S & G _____	_____. _____
Grader: _____	Grader: _____	Grader: _____	**Final Score**

PLACE LABEL BELOW

Name:_____ School:_____

SS/ID Number:_____ City:_____

Grade: 4 5 6 7 8 Classification: 1A 2A 3A 4A 5A 6A



TMSCA MIDDLE SCHOO CALCULATOR REGIONAL TEST © MARCH 2, 2019

GENERAL DIRECTIONS

I. About this test:
- A. You will be given 30 minutes to take this test. There are 80 problems on this test.
- **B. ALL calculators must be cleared. HP Prime and Casio Prizm calculators are NOT permitted.**

II. How to write the answers:
- A. For all problems except stated problem as noted below write three significant digits.
  1. Examples (* means correct, but not recommended)
     Correct: 12.3, 123, 123.*, 1.23x10*, $1.23x10^{0}$*, $1.23x10^{1}$, $1.23x10^{01}$, .0190, $1.90x10^{-2}$
     Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230x10^{2}$, $1.23*10^{2}$, 0.19, $1.9x10^{-2}$, $19.0x10^{-3}$, 1.90E-02
  2. Plus or minus one digit error in the third significant digit is permitted.
- B. For stated problems:
  1. Except for integer, dollar sign, and significant digit problems, as detailed below, answers to stated problems should be written with three significant digits.
  2. Integer problems are indicated by (integer) in the answer blank. Integer problems answers must be exact, no plus or minus one digit, no decimal point or scientific notation.
  3. Dollar sign ($) problems should be answered to the exact cent, but plus or minus one cent error is permitted. The decimal point and cents are required for exact dollar answers.

III. Some symbols used on the test.
- A. Angle measure: rad means radians; deg means degrees.
- B. Inverse trigonometric functions: arcsin for inverse sine, etc.
- C. Special numbers: π for 3.14159 . . . ; e for 2.71828.
- D. Logarithms: Log means common (base 10); Ln means natural (base e).

IV. Scoring:
- A. All problems answered correctly are worth FIVE points. FOUR points will be deducted for all problems answered incorrectly or skipped before the last problem attempted.

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2018-2019 TMSCA Middle School Calculator Regional Qualifier

1. 476 – 1200 ---------- 1=_____

2. –43 + 44 – 5 ---------- 2=_____

3. –1420 – 1370 + 1080 ---------- 3=_____

4. π – 15 + 7 – 8 ---------- 4=_____

5. –230 + 591 + 369 + 725 ---------- 5=_____

6. 123 – 98 – 229 + 154 + 221 ---------- 6=_____

7. (0.683 – 0.524) + (1.66 – 0.458 – 0.906) ---------- 7=_____

8. –0.352 – 0.925 + 0.633 – 0.28 – 0.227 ---------- 8=_____

9. 203 x 79.2 x 260 ---------- 9=_____

10. 1110 x 304 x 1210 x 2460 ----------10=_____

11. Calculate the product of the first two palindrome numbers greater than 100. ----------11=_____

12. Bamboo is one of the fastest growing plants on earth. Some species can literally grow 10 cm per day. If this plant could structurally support it, calculate how many days it would take to grow a mile high. ----------12=_____days

13. Pi is what percent of ten thousand? ----------13=_____

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14. $(-262)[660 \times 575 \times 426]$ ----------14=_____

15. $63/[114 \times 186 \times 193]$ ----------15=_____

16. $\left[\frac{44}{147}\right][(140/100) - 0.206]$ ----------16=_____

17. $\left[\frac{69}{44}\right][(32/31) + 0.732]$ ----------17=_____

18. $\left[\frac{(1230/1110) - (1230/980)}{139/(93.1)}\right]$ ----------18=_____

19. $\frac{[33.8/(107)]/0.449}{(0.00572 \times 0.0076)(0.00348)}$ ----------19=_____

20. $(1.59)[75/13 \times 53/79] - 0.83$ ----------20=_____

21. $\frac{487}{(246 - 483)} - \frac{(257 - 344)}{407}$ ----------21=_____

22. $\frac{(1230 + 3570 - 1210)}{\{(41 - 48.4)/(0.0999)\}}$ ----------22=_____

23. $\left[\frac{1340 + 1450}{1490 - 1350}\right]\left[\frac{703}{1470}\right]$ ----------23=_____

24. Bill purchased two types of fruit, nectarines at \$1.74 per pound and peaches at \$1.29 per pound. If he purchased 5 pounds of each, calculate his change from a \$20 bill. ----------24=\$_____

25. Sarah figured that the polygon she drew had 434 distinct diagonals. Calculate the number of sides the polygon had that she drew. ----25=_____INT.

26. Calculate the geometric mean of π^5, log 251, e^{27}, and ln 82. -----26=_____

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27. $(5.85\times10^{-4})[[0.534/(0.262)][0.00536/(0.00518)]]$ --------27=_____

28. $\dfrac{(9.12 - 4.91)(53.2 + 43.7)}{(1.71\times10^{11})}$ ----------28=_____

29. $\dfrac{(9.56\times10^{10}) + (2.45\times10^{10})}{(-2.49)(1.78) - \pi}$ ----------29=_____

30. $(0.0653)\left[\dfrac{13.5}{(2.10\times10^{11})}\right]$ ----------30=_____

31. $\dfrac{1}{32.8} + \dfrac{1}{(\pi)(19.8 - \pi)}$ ----------31=_____

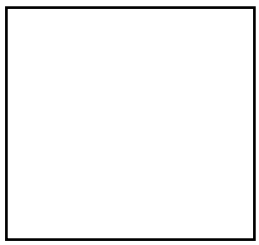
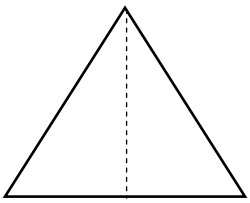
32. $\dfrac{1}{-145} + \dfrac{1}{(46.8 - 93.9)}$ ----------32=_____

33. $\dfrac{1}{57.8} - \dfrac{1}{(355 + 202)}$ ----------33=_____

34. $\left[\dfrac{1/1950}{1/1240}\right][6.21\times10^{5}]$ ----------34=_____

35. Calculate 721^{857}. ----------35=_____

36. Calculate the 18th pentagonal number. ----------36=_____INT.

SQUARE	EQUILATERAL TRIANGLE
 Perimeter = 7272 Diagonal = ?	 Height = 2715 Perimeter = ?
37=_____	38=_____

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39. $\left[\frac{17.8}{0.978}\right](28.2 + 42.3)^2$ ----------39=_____

40. $(74.3 + 40)^2(25.9 + 21.3)^2$ ----------40=_____

41. $\left[\frac{3630 + (1/(9.57x10^{-4}))}{(2330/6340) - 0.0696}\right]^2$ ----------41=_____

42. $(1/\pi)\sqrt[3]{\frac{1.2 + 0.298}{0.767 - 0.689}}$ ----------42=_____

43. $(1/(0.00766))(1820 - 1630)^3$ ----------43=_____

44. $\sqrt{(2660/3480) + 0.684 - 0.417}$ ----------44=_____

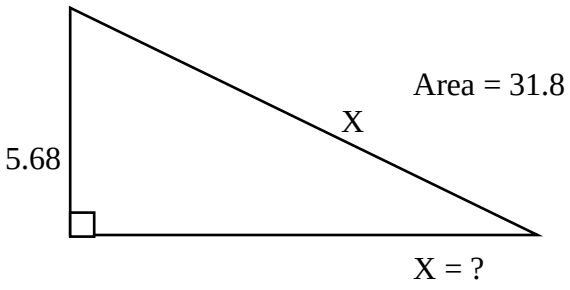
45. $\frac{1}{\sqrt{547 + 636 + 351}} + \left(\frac{1}{\sqrt{0.771}}\right)^4$ ----------45=_____

46. $\left[\sqrt[4]{(13000/8280)(1.71)}\right]^5$ ----------46=_____

47. Calculate the sum of the exterior angles of a regular nonagon. ----47=_____°

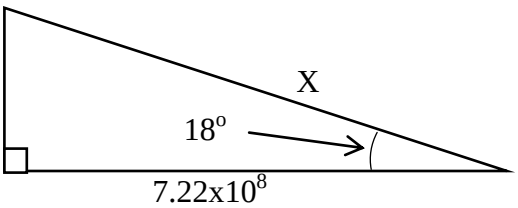
48. The sum of two positive integers is 224. The difference of the two integers is 190. Calculate the smaller of the integers. ----------48=_____INT.

RIGHT TRIANGLE



49=_____

RIGHT TRIANGLE



50=_____

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51. $\left[\frac{\sqrt{\sqrt{23.2 - 12.4}}}{-(8.58 - 27.3)}\right]^2 [351 + 2040]$ ----------51=_____

52. $\left[\frac{15.9 - 12.4 + \sqrt{2410/224}}{-14.1 + 20.1}\right]^3$ ----------52=_____

53. $\left[\frac{685 + 644 + \sqrt{8.61x10^5 + 7.72x10^5}}{145/118}\right]^3$ ----------53=_____

54. $\sqrt{\frac{(17700)(32400)}{(4470)(3260)}} - 1.8 + 2.91$ ----------54=_____

55. $0.734 + \sqrt{(3820)/(2340)} - (0.204 + 1.09)^2$ ----------55=_____

56. $694 + \sqrt{(1230)(689)} - (148 + 1130)$ ----------56=_____

57. (deg) $\sin(368^\circ) + (1230/676)$ ----------57=_____

58. (rad) $\cos(86.3) + (22.6/86)$ ----------58=_____

59. There is a sixty percent chance it will rain this weekend. Calculate the odds of it raining this weekend. ----------59=_____

60. A 10 foot teeter totter is balanced with 120 pound Thomas on one side and 98 pound Sam on the other. Sam sits at the very end of his side of the teeter totter, 5 feet from the fulcrum. Calculate how far Thomas should sit from the fulcrum to balance the teeter totter. ----------60=_____ft.

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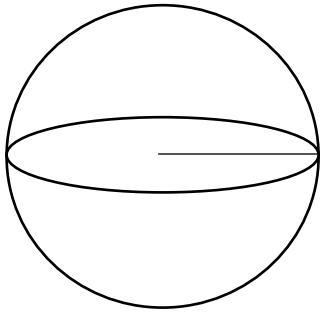
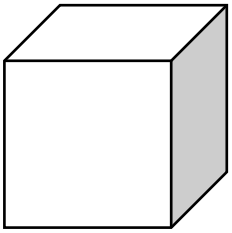
SPHERE	CUBE
 Radius = 5.27 Ratio of volume to surface area = ?	 Edge = 7.81 Ratio of surface area to volume = ?
61=_____	62=_____

63. $\frac{5!}{7!} + 0.0703$ ----------63=_____

64. (deg) (1370 + 944)sin(546°) ----------64=_____

65. $(13 - \pi)e^{0.292}$ ----------65=_____

66. (deg) cos(2.69° – 3.19°) + 0.637 ----------66=_____

67. (rad) $\sin\left[\frac{(36.3)(\pi)}{(267)(1.16)}\right]$ ----------67=_____

68. (deg) $\frac{\sin(14.3°)}{\tan(14.3°)}[359]$ ----------68=_____

69. (rad) (30800)cos(4.12) ----------69=_____

70. $(88.5 - 86.6 + 102)^{2/3}$ ----------70=_____

71. The odds of an event happening are 6:31. Calculate the probability the event won't happen. ----------71=_____

72. Mom and Dad invested $10,000 at 5% compounded annually when their daughter was born to pay for college. Eighteen years later their daughter graduated. Calculate how much they will have in the account to pay for college. ----------72=$_____

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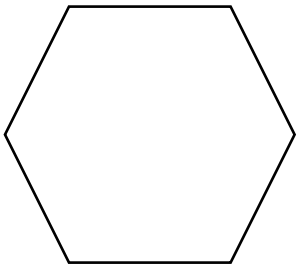
REGULAR HEXAGON

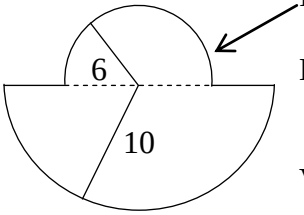


Edge = 251

Apothem = ?

73=_____

BASE OF A RIGHT SOLID IS SHOWN



Height = 8

Volume = ?

74=_____

75. $\frac{(1.49)^{0.807}(3.75)^{0.724}}{(37.6 - 19)^{-9}}$ ----------75=_____

76. $\frac{\text{Log}(4.77 + 1.56)}{2.85 - 2.9}$ ----------76=_____

77. $\frac{2500 - 1030}{\text{Log}(47.2 + 62.7)}$ ----------77=_____

78. $(1.18)^{\pi}(3.57)^{5}(4.91 - 3.06)^{3}$ ----------78=_____

79. $1 + 3 + 5 + \ldots + 477$ ----------79=_____

80. $\frac{1}{(0.109)} + \frac{1}{3(0.109)^{3}} + \frac{1}{5(0.109)^{5}} + \frac{1}{7(0.109)^{7}}$ --------80=_____

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2018-2019 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 1

1 = -724
= -7.24×10^{2}

2 = -4.00
= -4.00×10^{0}

3 = -1710
= -1.71×10^{3}

4 = -12.9
= -1.29×10^{1}

5 = 1460
= 1.46×10^{3}

6 = 171
= 1.71×10^{2}

7 = 0.455
= 4.55×10^{-1}

8 = -1.15
= -1.15×10^{0}

9 = 4.18×10^{6}

10 = 1.00×10^{12}

11 = 11200
= 1.12×10^{4}

12 = 16100
= 1.61×10^{4}

13 = 0.0314
= 3.14×10^{-2}

Page 2

14 = -4.24×10^{10}

15 = 1.54×10^{-5}

16 = 0.357
= 3.57×10^{-1}

17 = 2.77
= 2.77×10^{0}

18 = -0.0985
= -9.85×10^{-2}

19 = 4.65×10^{6}

20 = 5.32
= 5.32×10^{0}

21 = -1.84
= -1.84×10^{0}

22 = -48.5
= -4.85×10^{1}

23 = 9.53
= 9.53×10^{0}

24 = $4.85

25 = 31 INT.

26 = 6440
= 6.44×10^{3}

Page 3

27 = 0.00123
= 1.23×10^{-3}

28 = 2.39×10^{-9}

29 = -1.59×10^{10}

30 = 4.20×10^{-12}

31 = 0.0496
= 4.96×10^{-2}

32 = -0.0281
= -2.81×10^{-2}

33 = 0.0155
= 1.55×10^{-2}

34 = 395000
= 3.95×10^{5}

35 = 1.78×10^{2449}

36 = 477 INT.

37 = 2570
= 2.57×10^{3}

38 = 9410
= 9.41×10^{3}

Page 4

39 = 90500
= 9.05×10^{4}

40 = 2.91×10^{7}

41 = 2.46×10^{8}

42 = 0.852
= 8.52×10^{-1}

43 = 8.95×10^{8}

44 = 1.02
= 1.02×10^{0}

45 = 1.71
= 1.71×10^{0}

46 = 3.44
= 3.44×10^{0}

47 = 360
= 3.60×10^{2}

48 = 17 INT.

49 = 12.6
= 1.26×10^{1}

50 = 7.59×10^{8}

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Page 5

51 = 22.4
= 2.24×10^{1}

52 = 1.44
= 1.44×10^{0}

53 = 9.55×10^{9}

54 = 7.38
= 7.38×10^{0}

55 = 0.337
= 3.37×10^{-1}

56 = 337
= 3.37×10^{2}

57 = 1.96
= 1.96×10^{0}

58 = 0.169
= 1.69×10^{-1}

59 = 1.50
= 1.50×10^{0}

60 = 4.08
= 4.08×10^{0}

Page 6

61 = 1.76
= 1.76×10^{0}

62 = 0.768
= 7.68×10^{-1}

63 = 0.0941
= 9.41×10^{-2}

64 = -242
= -2.42×10^{2}

65 = 13.2
= 1.32×10^{1}

66 = 1.64
= 1.64×10^{0}

67 = 0.360
= 3.60×10^{-1}

68 = 348
= 3.48×10^{2}

69 = -17200
= -1.72×10^{4}

70 = 22.1
= 2.21×10^{1}

71 = 0.838
= 8.38×10^{-1}

72 = $24,066.19

Page 7

73 = 217
= 2.17×10^{2}

74 = 1710
= 1.71×10^{3}

75 = 9.57×10^{11}

76 = -16.0
= -1.60×10^{1}

77 = 720
= 7.20×10^{2}

78 = 6180
= 6.18×10^{3}

79 = 57100
= 5.71×10^{4}

80 = 795000
= 7.95×10^{5}

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TMSCA 18-19 MS CA Test Regional Solutions to Word and Geometry Problems

11. 101(111)

12.
$$\left(1mi \cdot \frac{5280ft}{1mi} \cdot \frac{12in}{1ft} \cdot \frac{2.54cm}{1in}\right) \div 10$$

13. $\frac{x}{100} = \frac{\pi}{10000}$; $x = \frac{100\pi}{10000}$

24. 20 – 5(1.74) – 5(1.29)

25. $\frac{n(n-3)}{2} = 434$;
$$n(n-3) = 434(2)$$
$$n^2 - 3n - 868 = 0$$
$$(n-31)(n+28) = 0$$
$n = 31$. You could also use the quadratic formula to solve this.

26.
$$\sqrt[4]{(\pi^5)(log251)(e^{27})(ln82)}$$

35. $\mathbf{721^{857}}$ 857 [ENTER]
721 [LOG] [x] [SHOW]

(Look at the digits to the left of the decimal. This gives 2449 for the exponent. Write down 2449.) Punch

2449 [–] [10^x]

(This gives 1.78 E0 which is the first part of your answer. This is done on the HP RPN calculator.

36. $\frac{18[18(3)-1]}{2}$

37. d = $\left(\frac{7272}{4}\right)(\sqrt{2})$

38. Side = $2\left(\frac{2715}{\sqrt{3}}\right)$
Perimeter = $3\left[2\left(\frac{2715}{\sqrt{3}}\right)\right]$

47. The sum of the exterior angles is always 360 degrees.

48. x=largest, y = smallest
$$\begin{Bmatrix} x+y=224 \\ x-y=190 \end{Bmatrix}$$
$$\begin{Bmatrix} x+y=224 \\ -x+y=-190 \end{Bmatrix}$$
$$2y = 34$$
$$y = 17$$

49. b = base = long leg
$31.8 = \frac{5.68b}{2}$; $b = \frac{31.8(2)}{5.68}$
Use Pythagorean Theorem to find x.
$$x = \sqrt{5.68^2 + \left[\frac{31.8(2)}{5.68}\right]^2}$$

50. $\frac{\cos 18}{1} = \frac{7.22\,x10^8}{x}$

$$x = \frac{7.22\,x\,10^8}{\cos 18}$$

59. 60% chance it will rain
40% chance it won't rain
Odds: $\frac{60}{40}$

60. 120x = 5(98)
$$x = \frac{5(98)}{120}$$

61. Ratio of volume to surface area
$$\frac{\frac{4}{3}\pi r^3}{4\pi r^2} = \frac{1}{3}r = \frac{1}{3}(5.27)$$

62. $\frac{6e^2}{e^3} = \frac{6}{e} = \frac{6}{7.81}$

71. 6 ways that it will happen
31 ways it won't happen
Probability that it won't happen = $\frac{31}{37}$

72. $10000(1.05)^{18}$

73. A hexagon is 6 equilateral triangles. The apothem is the height of one of those triangles.
$$\left(\frac{251}{2}\right)(\sqrt{3})$$

74. V = Bh

$$B = \frac{\pi(10)^2}{2} + \frac{\pi(6)^2}{2} = \frac{136\pi}{2}$$
$$h = 8$$
$$V = \left(\frac{136\pi}{2}\right)(8)$$